Oct. 19, 1926. 1,603,832

E. A. BOHLMAN ET AL

TRANSFORMER

Filed May 23 1923

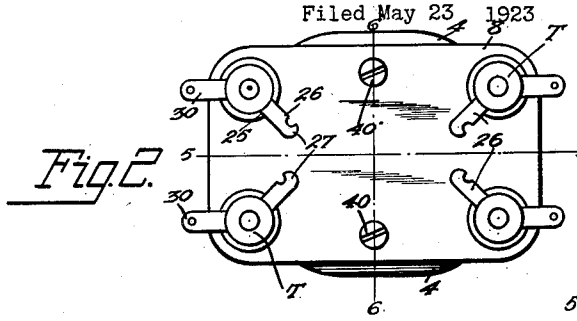


Fig. 2.

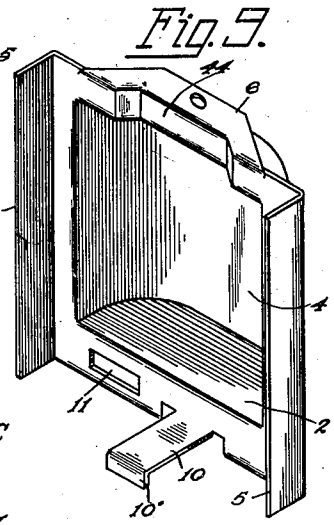


Fig. 9.

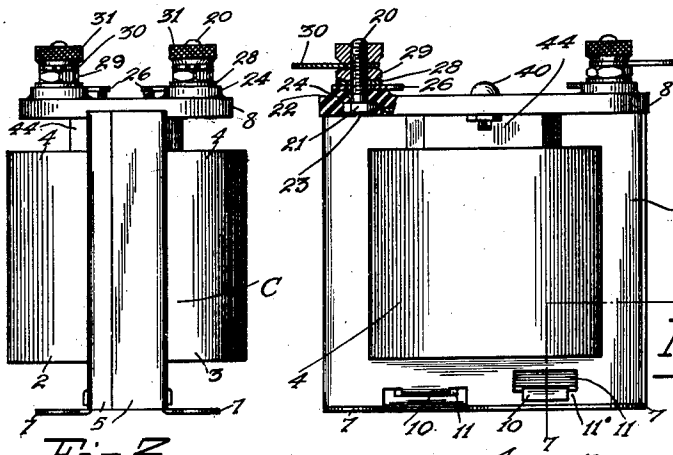


Fig. 3.

Fig. 1.

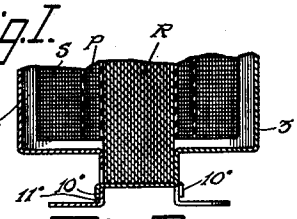


Fig. 7.

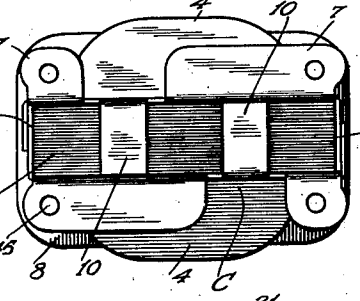


Fig. 4.

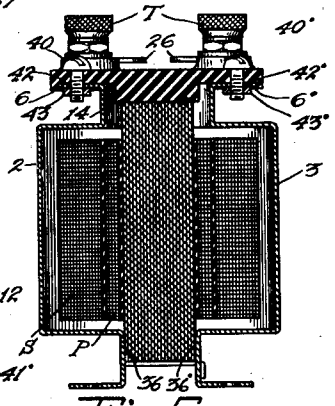


Fig. 6.

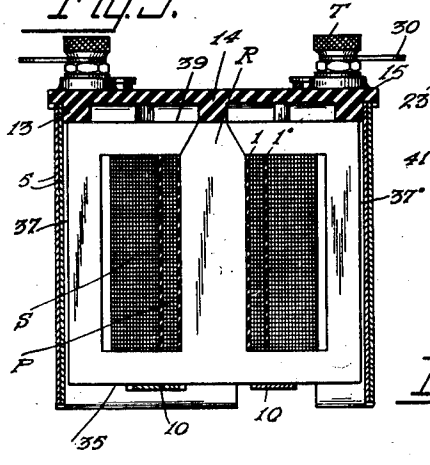


Fig. 5.

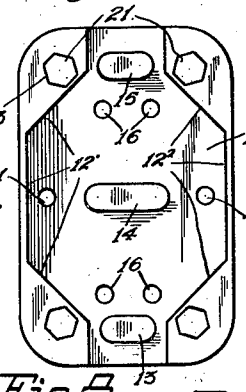


Fig. 8.

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UNITED STATES PATENT OFFICE.

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TRANSFORMER.

Application filed May 23, 1923. Serial No. 640,831.

Our invention relates to transformers and has to do more particularly with the construction and assemblage of the various parts in a simple, economical and efficient manner whereby a transformer is provided which is cheap to manufacture and efficient in its operation.

A feature of our invention is the provision of an enclosing case for enclosing certain parts of our transformer, which case comprises two parts, and which parts are so constructed and formed as to permit their being secured together to enclose the different parts of our transformer, and to provide means for mounting our transformer in position on any suitable mounting or supporting means.

Another feature of our invention is the provision of a combined terminal rack and cover cap to which is secured terminals. for connecting external conductors to the windings of our transformer, and which cover cap is provided with a depressed body portion of a size and shape to receive suitably shaped ends of the parts of the enclosing case of our invention to secure said ends together against displacement.

Still another feature of our invention is the provision of means integrally formed with the combined terminal rack and cover cap for engaging the laminations of the core of our transformer to prevent displacement of the same from their mounted operative position and also to separate the cover cap from said core.

Another feature of our invention lies in the manner in which we secure the terminals to the combined terminal rack and cover cap against rotation; and to retain certain parts of the terminals in a certain definite position to permit the soldering of the conductors leading from the windings of our transformer to said certain parts.

Still, a further feature of our invention is the provision of a depression in each half of our enclosing case for permitting the windings of our transformer to be connected with the terminals secured to the combined terminal rack and cover cap without interfering with the laminations of the core of our transformer.

The above mentioned features as well as others will be more specifically pointed out in the ensuing specification. For a clear understanding of our invention reference may be had to the accompanying drawing, in which, like reference characters in the several views denote like parts, and in which;

Fig. 1 is a plan view of our invention;

Fig. 2 is a top plan view of Fig. 1;

Fig. 3 is a side view of Fig. 1;

Fig. 4 is a bottom plan view of Fig. 1;

Fig. 5 is a sectional view of our invention along the line 5—5 of Fig. 2;

Fig. 6 is a sectional view of our invention along the line 6—6 of Fig. 2;

Fig. 7 is a view along the line 7—7 of Fig. 1;

Fig. 8 is a bottom plan view of the combined terminal rack and cover cap of our invention showing its construction.

Fig. 9 is a plan view of one the halves or parts of the enclosing case of our invention.

Referring now in detail to our invention, R is the core of our transformer, and is composed of a plurality of laminations of suitable material, and which laminations are suitably shaped and formed to receive the usual layers of the primary winding P and layers of the secondary winding S, each layer being suitably insulated from the other layers by a suitable layer of insulation, such as paraffined or waxed paper, or the like, as is well known in the art. The primary winding P is insulated from the core R by an insulation sleeve 1, and the secondary winding S is insulated from the primary winding P by an insulation member 1'.

The enclosing case C, for enclosing the laminated core R and windings P and S, comprises two halves or parts 2 and 3 and as each half or part is constructed in the same identical manner, a description of one will suffice for a clear understanding of the other half or part. For the sake of description part 2 will be described. The half or part 2 is stamped out of a suitable piece of material and is provided with a pocket 4, for receiving a portion of the layers of windings P and S and layers of insulation as will be more clearly pointed out in the ensuing specification. A pair of flanges 5

integrally formed with the half 2 is provided, and the ends 6 and 7 of said half 2 are turned over at right angles with the main body portion of said half 2, and parallel to each other. The end 6 is adapted to support the combined terminal rack and cover cap 8. The end 7 is adapted to secure our transformer to any suitable mounting or supporting member. A wing member 10 is provided which is integrally formed with the half or part 2, and a slot 11 is also provided, the purpose of said wing 10, and slot 11 will be pointed out later.

The combined terminal rack and cover cap 8 of our invention, is formed out of some suitable non-conducting material, such as bakelite, or the like, and has a depression 12 formed therein, the walls of said depression being of the same contour as the end 6 of the half or part 2 of the case C, and is adapted to receive the ends 6 and 6′ of halves 2 and 3 of the casing C as will later be pointed out more in detail. Members 13, 14 and 15 which are integrally formed with the cover cap 8, are provided and are adapted to engage the laminations of the core of our transformer to assist in retaining the said laminations in position against displacement and also to separate the cover cap 8 from said laminations to permit the conductors leading from the windings P and S of our transformer, to be led through suitable openings 16, in the cover cap 8, to the terminals T secured to the said cover cap 8.

To the cover cap 8 is secured a number of terminals T which serve to connect external conductors with the windings P and S of our transformer, and since each one of said terminals is the same and secured to the cover cap 8 in the same manner, a description of one will be sufficient to give a clear understanding of the others of said terminals. A screw threaded member 20, having a hexagonally shaped head 21 is provided and has its threaded end extending through a suitable opening 22 in the cover cap 8, while its hexagonal head engages a hexagonally shaped depression 23 in the cover cap 8. By having the hexagonal head 21 of member 20 engaging the hexagonal depression 23 of cover cap 8, it is obvious that the said member 20 will be prevented from rotating within the opening 22 of the cover cap 8. A collar or raised portion 24, formed integrally with the cover cap 8, is provided and has a groove 25 cut therein. A member 26 is provided and has an opening in its one end, to permit it to be slipped over the threaded end of the member 20, the said one end of said member 26 resting on the cover cap 8 within the collar or raised portion 24, the other or free end 27 of said member 26 will be positioned over the opening 16 in the cover cap 8, so that the conductor leading from the transformer winding P or S may be led through said opening 16 and soldered to the said end 27 of member 26, and to prevent displacement of member 26 relative to the opening 16, an intermediate portion of the body of said member 26 will engage and rest in the groove 25 provided in the collar or raised portion 24. A spring washer 28 is slipped over the end of member 20 and brought into engagement with the member 26, and a hexagonal nut 29 is screwed down on the threaded end of member 20 and against spring washer 28, the spring washer 28 serving for the well known purposes. A member 30 is now slipped over the threaded end of member 20 and brought into engagement with the nut 29, said member 30 being adapted to have an external conductor soldered to its free end; and to secure the member 30 on the member 20, a nut 31 is provided which has screw-threaded engagement with the member 20, and when screwed down into engagement with said member 30, it will hold the member 30 in place.

Having described the different parts of our invention, a description of the manner in which the halves or parts 2 and 3 are secured together to enclose the core R and windings of our transformer, and the manner in which the cover cap 8 is secured in position on the case C will now be given.

The wing 10 of the half 2, has its end 10′ turned back at right angles to the main body portion of said wing 10 and is adapted to pass through the opening 11 in the half or part 3 of the case C and to engage the portion 11′ below the said opening 11, and the wing 10 of the half 3 has its end turned back at right angles to the main body portion of said wing of said half 3, and is adapted to pass through the opening 11 in the half 2 of the case C, and to engage the portion 11′ below opening 11 in said half 2. The openings 11 and wing 10 of the halves or parts 2 and 3 of the case C are so positioned that one of the flanges 5 of the half 2 will engage the inner face of one of the flanges 5 of the half 3, while the other flange 5 of the half 2 will engage the outer face of the other flange 5 of the half 3 of said case C. When the wings 10 of halves 2 and 3 are engaging the openings 11 in said halves, the ends 6 and 6′ may be separated sufficiently far enough to permit the insertion of the laminated core R and the layers of the windings P and S and layers of insulation carried by said laminated core R, so that portions of said layers of the windings and layers of insulation will engage the pockets 4, provided in the halves 2 and 3 of the case C, the wings 10 and openings 11, serving to give a hinge effect when the ends 6 and 6′ are separated to permit the insertion of the core R and layers of windings and layers of insulation. When the laminated core R, and layers of windings and layers of insulation are inserted, and

portions of the layers of the windings and insulation case engaging the pockets 4 of the case C, the end 35 of the laminated core R will engage and rest upon the wings 10 of the halves 2 and 3 of the case C. The ends 6 and 6′ of the halves 2 and 3 of the case C are now pressed together to bring the flanges 5 together their entire length, as pointed out above, whereby the inner faces 36 and 36′ of halves 2 and 3 respectively of the case C, will engage the laminated core R, while the flange 5 of said halves 2 and 3 will be in close proximity to the ends 37 and 37′ of said laminated core R. The cover cap 8 is now placed over the ends 6 and 6′ of halves 2 and 3, so that said ends 6 and 6′ will engage the walls 12′ and 12² respectively of the depression 12 in said cover cap 8, and the members 13, 14 and 15 will be brought into engagement with the end 39 of the laminated core R, and to secure the cover cap 8 in position upon the said ends 6 and 6′, screws 40 and 40′ are provided which extend through suitable openings 41 and 41′ in the cover cap 8 and openings 42 and 42′ in the case C, and then have screw-threaded engagement with suitable nuts 43 and 43′. An elongated depressed portion 44 is provided in the ends 6 and 6′ of the halves 2 and 3 of the case C for receiving the conductors, connected to the windings of our transformer, to permit the said conductors to be led to the openings 16 in the cover cap 8, whereupon said conductors extend through the said openings 16 and are soldered to the proper members 26 of terminals T. The turned back ends 10′ of the wings 10 of the halves 2 and 3 engaging the body portion 11′ below the openings 11 in said halves 2 and 3, will secure the said halves together at one end, and the cover cap 8 and screws 40 and 40′ and nuts 43 and 43′ will secure the other ends of said halves together to form the cover case C of our transformer, and the laminated core R will engage and be clamped between the members 13, 14 and 15 of the cover cap 8 and the wings 10 of the halves 2 and 3, to prevent longitudinal movement of said laminated core R in one direction, and the flanges 5 of said halves 2 and 3 will prevent longitudinal movement of said core R in the other direction, while the portions of the layers of the windings and layers of insulation will engage the pockets 4 formed in the said halves 2 and 3 of the case C. To secure our transformer upon a suitable mounting or supporting member, openings 45 are provided in the ends 7 of the halves 2 and 3 and which openings are adapted to receive suitable screws.

While we have shown and described a preferred embodiment of our invention, it is to be understood that we do not wish to be limited to the exact structure as shown and described but intend to cover all changes and modifications, that may come within the scope and spirit of the appended claims.

Having described our invention what we claim as new and desire to secure by United States Letters Patent is:—

1. In a device of the character described, a core, windings for said core, an enclosing case comprising two parts for receiving and enclosing said core and windings, means integrally formed with said parts for securing said parts together at one end, and a cover cap provided with a depression for receiving the opposite end of said parts to secure the same together, and means for engaging said cover cap and the said parts of said case for preventing displacement of said cover cap and said parts of said case.

2. In a transformer of the character described, an enclosing case comprising two parts for receiving and enclosing said transformer, means integrally formed with said parts for securing said parts together at one end, a top cover for said case having a body depression for receiving one end of each of said parts for securing said parts together, and means for preventing the displacement of said top cover from said case.

3. In a transformer of the character described, an enclosing case comprising two parts for receiving and enclosing said transformer, flanges integrally formed with said parts, the flanges of one of said parts adapted to engage the flanges of the other of said parts, means integrally formed with said parts for securing said parts together at one end, and a top cover adapted to fit over the opposite ends of said parts to secure said opposite ends together, said top cover and said means adapted to prevent longitudinal movement of said transformer in one direction while said flanges prevent longitudinal movement of said transformer in the other direction and means for securing said top cover on said enclosing case.

4. A transformer of the class described including a laminated core, windings for said laminated core, an enclosing case comprising two parts for enclosing said core and windings, pockets formed in the said parts of said case, for receiving portions of said windings, means integrally formed with said parts for securing said parts together at one end and for supporting said laminated core, a cover cap provided with a body depression for receiving ends of said parts to secure the same together, whereby said laminated core and windings are secured between said parts, and means integrally formed with said cover cap for engaging said laminated core, said first and last means adapted to prevent longitudinal movement of said laminated core.

5. A transformer of the class described including a laminated core and windings for the same, an enclosing case comprising two

parts for receiving and enclosing said core and windings, means integrally formed with said parts for securing said parts together at one end, and adapted to give a hinge effect to permit the insertion of said core and windings into said case, a cover cap provided with a depression for fitting over the other ends of said parts, the said other ends of said parts engaging the walls of said depression whereby said parts are secured together and said laminated core and said windings are secured between the parts of said case, and means integrally formed with said cover cap for separating said cover cap from said laminated core and adapted to co-operate with said first means to prevent longitudinal movement of said laminated core within said enclosing case.

6. A transformer of the class described, including a laminated core and windings for said laminated core, an enclosing case comprising two parts for receiving and enclosing said core and windings, a cover cap for said case adapted to receive one end of said case and to be secured thereon, terminals secured to said cover cap, means for said terminals for connecting external conductors with the windings of said laminated core, means formed integrally with said case and means formed integrally with said cover cap, said means adapted to cooperate to permit the leads of the windings of said laminated core to be conducted and connected to said terminals without interfering with any part of said transformer.

7. A transformer of the class described including a laminated core provided with windings, a case for receiving and enclosing said core and windings, a cover cap, provided with a depression and adapted to engage said case, a terminal secured to said cover cap, a member for said terminal for receiving an external conductor, another member for said terminal for receiving a conductor extending from one of the windings of said laminated core, said last conductor extending through an opening in said cover cap, and means integrally formed with said cover cap for retaining said second member in a certain position relative to the opening in said cover cap.

8. A transformer of the class described including a laminated core, windings for said core, a case for receiving and enclosing said core and windings, a cover cap provided with a depression and adapted to engage said case, a terminal secured to said cover cap, said terminal having a hexagonally shaped head for engaging a hexagonally shaped depression in said cover cap to prevent rotation of said terminal, a member for said terminal, for connecting one of the windings of the transformer to said terminal via an opening in said cover cap, and a depression in said cover cap adapted to be engaged by said member for retaining said member in a certain position relative to said opening in said cover cap.

9. A transformer of the class described including a core and windings for said core, a case for supporting and enclosing said core and windings, a top cover provided with a depression and adapted to engage said case, a terminal secured to said top cover, said terminal having a hexagonally shaped head for engaging a hexagonally shaped depression in said top cover to prevent rotation of said terminal, a member for said terminal, means integrally formed with said top cover for receiving said member and to retain the same in a stationary position relative to the opening in said top coyer, means integrally formed in said case and means integrally formed with said top cover for permitting one of the windings of said core to be connected to said member via said opening in said top cover without interfering with any part of the transformer.

10. A transformer of the class described, including a laminated core and windings for said laminated core, a case for supporting and receiving said laminated core and windings, a top cover provided with orifices and adapted to engage said case, said top cover also provided with openings having a portion of their walls angularly shaped, terminals engaging said openings and angularly shaped walls and secured therein against rotation, members secured on said terminals and in operative position relative to said orifices in said cover cap, means for connecting the windings of said core with said members via said orifices, and means integrally formed with said case for supporting said transformer on a mounting plate or base.

11. A transformer of the character described including a casing comprising a plurality of parts each having an extending wing portion and an orifice, the wing portion of one part adapted to engage the orifices of another part to form interlocking means, a cover for said casing, and means for securing said cover to said casing.

12. A transformer of the character described including a two-part casing having integrally formed interlocking members comprising extending portions adapted to engage an orifice in the other of said parts, and a terminal plate provided with means for securing the same to said casing to form a unit.

13. A transformer of the character described including a two-part casing having interlocking integrally formed members so arranged as to form a groove, a core extending into said groove in said casing, a terminal plate for said casing, means for attaching said terminal plate to said casing, and integrally formed means for said terminal plate resting against said core.

14. A transformer of the character de-

scribed including a casing formed of two members, integrally formed interlocking means for said members comprising an extending portion on each member adapted to engage an orifice in the other member, a transformer core resting against said integrally formed locking means, and a cover plate for said casing having integrally formed portions resting against said transformer core to hold the same in its proper position.

Signed by us at Chicago, in the county of Cook and State of Illinois, this 21st day of May, 1923.

ERNEST A. BOHLMAN.
MICHAEL B. STAZAK.